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tions—the Jay and the Purple Grackle from their nests in the apple trees; the Rose-breasted Grosbeak from the top of the hackberry; the Cardinal and Wood Thrush from the box elders across the river; the Orioles from their swinging nests in the elm and sugar maple; the Bee Martin and Warbling Vireo from the silver-leaved; the Jenny Wren from the eaves of the portico; the Cat-bird and Brown Thrasher from the gooseberry bushes, and the Maryland Yellow Throat from his nest in the thick weeds on the river's bank—all would come to devote a few minutes to scolding their common enemy.

The Jay, the Grackle, the Cat-bird, and the Robin would do the aggressive business, while the other birds, from a respectful distance, would be the spectators. The Robin, in particular, would show the greatest excitement in these attacks. He would often fly down to the ground near where I sat and in the most frantic manner try to call my attention to the fact that there was a terrible owl in the apple tree.

At first these attacks almost frightened the Screechers to death; but they soon became accustomed to them, and, in fact, seemed rather to enjoy this bird matinée.

One of these interesting birds was stoned to death by a man as it was perched upon the fence near his repair-shop. Another was shot and killed by a *kind-hearted* lady that wished to display her marksmanship. A third is still about town, and his tremulous notes are often heard around my premises in the dusk of the evening.

PRIMITIVE ARCHITECTURE.

I.

Sociological Influences.

BY BARR FERREE.

FOOD and shelter constituted the first and chief wants of primitive man, and to their satisfaction he devoted his dormant energies. At first, unable to construct his own shelter, he was obliged to depend upon such as nature furnishes. The *cave* was at once the most convenient and the safest. Its universal use in primitive times is attested by the vast number of remains and relics we find therein. Its use by the Rock Veddahs—one of the rudest races of mankind—has continued to the present day. History, however, furnishes other reasons for the use of the cave. Thus hermits affect them that they may be uncontaminated by worldly things, and the fisherman of the Yank-tse still uses them, as they are most convenient for his occupation.

As man became more accustomed to his surrounding, as his ideas became stronger and more definite, he set about building his own shelter. At first it was a mere pile of leaves and branches. If subject to a constant wind, he arranged a semi-circle of branches thrust upright into the ground, and often built a fire in the open side.[1] In a more advanced stage he builds a circle of branches, brings their tops together, and ties them with a strip of bark. But the hut is still incomplete, and remains so until the frame is interwoven with cross-branches and twigs, sometimes, as with the Fuegians, only on the windward side, sometimes, as with the Damaras, over the whole.

The shed has an origin equally early as the hut, although it was developed differently. In fact it depended on the material on hand whether this form or the other was adopted. In Australia,[2] where large strips of bark are readily obtained by the natives, a lean-to is the usual form; in Fernando Po,[3] on the other hand, a coarse matting stretched out on four poles is in universal use. The latter may be considered the normal form of shed, and we can trace its progress from these slightly inclined roofs to the elaborately finished, high-pitched roofs of the hot regions of South America.

The early habitations of man may be roughly classified as circular and rectangular. Much speculation has been indulged in as to the causes of this difference, and it is a singular fact that the two styles of dwellings are frequently found side by side in districts where there does not seem to be a natural cause for any distinction. It has been suggested that rectangular houses are characteristic of the communistic manner of living and circular ones of single families. The members of a single family can readily sleep around one fire; when several families are congregated under one roof several fireplaces are required, and the house is extended, usually in one direction. While this is true, there are many circular houses occupied in common, and there are also numerous instances among the rudest

[1] Tasmanian Journal, i., 250.

[2] Angas's Aust. and N. Zealand, ii., 212.

[3] Allen and Thompson's Narrative, ii., .197

peoples of one family occupying rectangular dwellings. The truth is, that the development of both the rectangular and the circular house is merely a plain case of natural development. First, we have a simple breakwind, a single strip of bark. Then comes one on two sides, another is added, and it is only necessary to close the remaining side to complete the square. These changes can be illustrated by numerous examples, but it is only necessary to mention two; the breakwind of the Australian savage represents the first stage, and the Patagonian tent,[1] formed of skins stretched on three sides of a square, the second. The shape of the dwelling does not, as might be supposed, depend on the manner in which the logs forming the sides are laid. When horizontal, we invariably have the rectangular hut, but they are placed vertically in both rectangular and circular dwellings. Nor is the explanation difficult, for the shed, supported by upright poles, is easiest enclosed by placing logs parallel to the first, and the rectangular house with walls of vertical logs is obtained.

The manner of life is an essential element in determining the form and character of a dwelling. In the earliest times man was constantly moving, seeking new shelter, new resting-places, new food. He could carry nothing with him in his migrations, for he had no means of conveyance. He was equally satisfied with a cave or a heap of leaves. Later, when he has learned to use a few simple tools, to skin animals, to prepare their skins, and to build his hut with some little care, he carried it with him. Hence the dwellings of nomadic peoples fall naturally into the two divisions of transportable and non-transportable, and the former are again subdivided into those covered with mats and those covered with skins.

Dwelling of Nomads { non-transportable
    transportable { Mats
        skins

Being easy of construction, mat tents are used by the rudest peoples. The Abipones pass their lives under two poles and a mat; the Zulus, standing higher in the social scale, find comfort in cages of pliant sticks, covered with finely woven rush mats.[2] Skin tents are used by more advanced races, since their use implies knowledge of the manufacture of the weapon with which to kill the animal, and of the mode of skinning and preparing the skin. They are used alike both by pastoral and hunting tribes, but seldom by purely agricultural ones, by the hunting Indians of North America, the Dakotas and Chippeways, by the pastoral bands of the extreme east and the far south, the Arabs and the Patagonians.

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[1] Anthro. Jour., i., 197.

[2] Burchell's Travels in Africa, ii., 198.

The agricultural nomads, moving less often than do the hunting and pastoral ones, build more permanent dwellings. Some, as the Gonds, move every few years. Their houses are of wattle and daub, thatched with teak-leaves ; within are two rooms, separated by a row of grain baskets, or by a bamboo screen, one serving as a living room, the other for storing.[1] Greater care is shown by the Bodo and Dhimals;[2] who, in addition to the central dwelling, build a cattle-shed ; and if the family is a large one, complete the quadrangle with two other dwellings. The Santals,[3] moving only when they have exhausted the soil at one place, build even a more elaborate group of buildings ; a verandah is placed at the gable end, and pigstys, buffalo-sheds, and dove-cots built within the common enclosure.

Many other causes than the fertility of the soil occasion the removal of the agriculturist. The Khonds[4] abandon their dwellings on decay ; the Western Kareens[5] seek new quarters on the encroachment of their enemies ; while the diseases generated by the heat expel the Caribs from theirs.

Turning to communism, which is, perhaps, as early a phase of life as the nomadic, we find that it also produces numerous variations in structure. And, first of all, it is interesting to trace the origin of communism as shown in the dwelling. The protection gained by numbers led many tribes to adopt this form of life. Such, for example, are the Pueblo Indians,[6] who erect large terraced buildings, often with no opening on the ground floor. Such, also, are the Mandans,[7] an unaggressive people, brave, but unable to contend with their powerful neighbors, the Sioux. Their houses are circular, from 40 to 60 feet in diameter; the walls are of thick logs, the roof of beams supported by posts, thatched with willow-boughs and prairie grass, and the whole covered with several feet of earth and clay. Two doors of buffalo skin protect the entrance.

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[1] Forsyth, Highlands of Central India, 99.

[2] B. H. Hodgson in Jour. As. Soc. Bengal, xviii., 741.

[3] Jour. As. Soc. Bengal, xx., 570.

[4] Macpherson, Report upon the Khonds of Ganjam and Cuttack, 59.

[5] Parrish in Jour. As. Soc. Bengal, xxxiv., 145.

[6] Morgan, 136.

[7] Ib., 126.

In addition the whole village is fortified. To the same cause may be attributed the peculiar villages of the Tupis, which consist of several houses arranged with their entrances opening on a common court, and the whole surrounded with a strong palisade.

The greater facilities communism affords for obtaining subsistence led the Iroquois to adopt that form of life. Those residing in villages lived in common, all partaking of the common store, while the venturous brave who went out after food lived a solitary life. To the same reason may be probably attributed the all but universal custom of communism among the North American Indians. The natives of Guiana furnish a curious variation of the women and children living in a detached cook-house.

In the far north cold has produced communism. The desire for greater warmth induced the Kamtschatdales, the Ostyaks[1] and the Esquimaux[2] to live in common during the long, cold months of winter, while light cool dwellings suffice for their abode in summer.

In studying the effect of communism on the structure of the dwellings, we note, first, that all communistic houses are very much larger than those intended for single families. They are of all sizes, from the Ojibwa wig-e-wam[3] for two or three families, up to the immense Long House of New Guinea, 30 x 300 feet and more, or the American Pueblo of a thousand rooms. As the size varies with the number of the inhabitants, so does the construction. The greater the number of people engaged in erecting a building, the greater the care taken and the better will be the materials used. Such is found to be the case with the dwellings of the Clatsops and Chinooks,[4] the walls of which are of white boards sunk in the ground, with a roof of timber fastened by cords of cedar bark and covered with two or three ranges of light poles. The Long House of the Seneca-Iroquois is another example. It is formed of a strong double frame of poles, with either a triangular or a semi-circular roof, enclosing large strips of elm bark, tied to it with strings or splints.[5] The Esquimaux furnish even a more striking instance, for the huge blocks of snow and ice used in their dwellings cannot be moved without the assistance of many men. The great care taken in the construction of communal dwellings is further shown by the use of larger material than is possible or even desirable in individual dwellings, as is shown in the huge pieces of bark covering the Ojibwa wig-e-wam, and the Iroquois Long House. Finally, it should be noted that communism sometimes produces remarkable changes in the appearance of the dwelling. Perhaps the most noteworthy instance is the village of the Yakut nation of Southern California,[1] consisting of a row of conical or wedge-shaped wig-e-wams, with a continuous awning of brushwood in front.

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[1] Latham's Des. Eth., i., 454.

[2] Cook's Sec. Voyage, ii., 237.

[3] Morgan, 113.

[4] Ib., 111.

[5] Ib., 120.

Although the changes produced by communism are of a limited nature on the exterior of the dwelling, it causes a great variety in the interior. First of all, we note variation in the number of partitions and in their construction. Some dwellings, as those of the Dakotas and of the Tupis—the latter containing from 20 to 30 families—are without any partition whatever. Others, as those of the Chinooks, have partitions in the larger houses—80 families—but none in the smaller. Then come partial partitions ; some, as in the elliptical lodges of the Kutchin tribe, radiating towards a central open space; others, as in the Iroquois Long House, having side partitions only. Finally, there are complete partitions, separate cabins under the same roof. These last are found in the houses of New Guinea,[2] huge edifices containing cabins of bamboo 10 feet square, with doors at the side and a fireplace between every two cabins. The Mishmis,[3] with similar dwellings, have a fireplace in each compartment.

Quite as much variety is found in the distribution of the passageways. First, none at all, as in the Kutchin lodges; next, a straight aisle down the middle, as in the Iroquois Long House. Differing from this only in position are the houses of the Mishmis, with a passage along one side, and the Kareens,[4] who form a passage all around the house. Finally, there is a perfect maze of passages, as in the dwellings of the Brokpas.[5]

A similar evolution is found in the arrangement and number of the fireplaces. Many, as with the Powhatans and Dakotas, the Kutchins and the Mandans,[6] have but a single fire in the centre of the dwelling. Others, again, as the Iroquois[7] and the Uraupes, arrange the fires in the central aisle, so that one fire serves for four cabins. More developed are the dwellings of New Guinea, with a fire to every two cabins, and of the Mishmis, with a fire to each cabin. Another form is found among the Mayas, who build a separate cook-house where the cooking for the whole village is done. The Ostyaks keep their food safe from the dogs in a village storehouse.

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[1] Morgan, 107.

[2] Jukes, Narrative of the Surveying Voyage of H. M. S. Fly, 272.

[3] Griffith in Jour. As. Soc. Bengal, vi., 333.

[4] Mason in Jour. As. Soc. Bengal, xxxvii., Pt. 126.

[5] Jour. As. Soc. Bengal, xlvii., Pt. 1, 34.

[6] Morgan, 126.

[7] Ib., 65.

There is no more singular mode of building than that of elevating the dwelling on poles. It is of most frequent occurrence among communistic peoples, but is by no means confined to them. Its origin has been long a favorite subject for controversy among students of primitive architecture. The historians of Timor allege that it arises from the fear of the reptiles that infest that fertile island, and we are also informed that such houses are constructed at Kurrecchane that the children may sleep safely at night. However well this custom in these places may be explained by these statements, it is sufficiently obvious that the explanation is not a universal one, and its origin must be looked for elsewhere. The best theory yet proposed is that of M. Frederick Troyon,[1] but which, though it is supported by many facts, fails when put to the test of universality. Beginning with the observation that all such buildings are built over or near water, M. Troyon argues that the rafts used in the early migrations afforded little protection to their owners, especially when the men were off hunting. Safety, however, was readily obtained by mooring in midstream, while, when pulled ashore, the raft was best kept from being washed away by the waves, by being elevated beyond their reach. Unfortunately for his theory, however, M. Troyon has ignored the fact that elevated houses are to be found both on the coast line and in interior districts where rafts would be impractical. Other and possibly many causes have contributed to the custom ; among them especially the desire for greater protection. It is not sufficient for the Sumatrans[2] that they hide their dwellings amid the trees on a hill-top, to which there is but one, or at most two, narrow paths of access, nor is a high and strong fence enough. They elevate their houses on posts and enter by means of movable notched poles. The theory of protection is confirmed by the solitary houses being more elevated than are the village houses. If the custom of building elevated houses originated with the natural fear of man for his race, then, in houses built over the water, the land side should be the strongest portion of the building, while the water side should be open or only lightly constructed. This is found to be the fact in the houses of New Guinea,[1] which have a stage on the water side that affords a convenient place for keeping the canoes. A confirmation of this explanation is seen in the custom of many maritime tribes of placing their dwellings where embarkment is attended with the greatest difficulty. Again, this mode of building is found prevalent among both warlike tribes, as the northern Kareens, and peaceful ones, as the Mishmis. All such instances point in the direction of the same cause; that they may better defend themselves against their enemies.

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[1] Troyon, Habitations Lacustres des temps anciens et modernes. Lausanne: 1860.

[2] Marsden, History of Sumatra, 56.

But greater protection is not the sole reason for the building of elevated houses. High floods make it imperative, as with the Waraus, or else drive the natives to elevated bits of land, as in the basin of the Orinoco. Tribes living near the coast and supporting themselves by fishing adopt this style of dwelling almost exclusively, while interior tribes prefer houses built directly on the ground. This distribution is especially marked in the East Indies.

Besides acting as an integral factor in producing communistic and elevated dwellings, the desire for better protection has brought about many other variations in structure. The location of the village is frequently selected with this end in view. Sometimes the hill-top is chosen, as by the Maiwar Bhils—who have a back door conveniently arranged for flight; with others the most secluded valleys are sought, as is done by the Santals;[2] others, again, hide their dwellings in clumps of trees. Some, also, as the Khonds,[3] place their villages in close proximity to each other, while the Bushmen[4] take the opposite course of building in high open spots where they cannot be attacked without warning.

A suitable site selected, the next step is to defend it. This leads to a judicious arrangement of the dwellings; a favorite plan being a circle with the entrances opening towards the central space, which is usual among the Andamese, the Bushmen, and the Kaffirs. When the chief of the village has developed into an important personage, his dwelling, for greater safety, is placed in the centre of the enclosing village. The Rajput and Bihé villages are illustrations of this fact.

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[1] Forrest's Voyages, 95.

[2] Jour. As. Soc. Bengal, xx., 569.

[3] Campbell, Wild Tribes of Khondistan, 49.

[4] Burchell, Travels into the Interior of Southern Africa, ii., 55.

The mere arrangement of the houses does not, however, furnish sufficient protection to the timid or the warlike tribes. Artificial fortifications must be raised. These are of two general kinds, those intended for the whole village and those only for single houses. The former include palisades, sometimes erected at the end of the street, as in the Khond villages, and as is usual in Africa, sometimes continued around the whole settlement, when it becomes a wall. The second class includes a great variety of expedents, dependent, chiefly, upon the ingenuity of the builder. Some, as in New Caledonia, are satisfied with building a fence close to their dwellings; others, as the Angain Nagas, surround themselves with a stone wall; others, again, as the New Zealanders, barricade their doors and windows with strong bars.

Rank and wealth have their influence upon dwellings. This is chiefly to be seen in their construction and size. The poor of every society, the lowest as well as the highest, live in meaner houses than do the wealthier classes. Not only will a rich man's house be larger than a poor man's, but in warm climates it will consist of more parts. The wealthy Kalmuck has a separate cooking tent, and the palace of a Javanese prince resembles a walled city.

Rank is further indicated by sundry external forms; for example, by the height of the dwelling, the elaboration of ornament, the shape and number of the roofs. The house of a Javanese chief has eight roofs, while the mass of the people are restricted to four.

EDITORS' TABLE.

EDITORS: E. D. COPE AND J. S. KINGSLEY.

The American Society of Naturalists at its recent meeting in Baltimore passed a resolution which requests its Executive Committee to consult with the corresponding representatives of certain other scientific bodies as to the next time and place of meeting. The societies referred to are all newly organized, and are: The American Physiological Society, the Society of Anatomists, and the American Geological Society. One of these, the Geological Society, arranged to meet during the Christmas holidays at Ithaca, N. Y., and it was stated that several of the geological members of the American Society would probably prefer to attend the meetings of